

REMARKS

This is intended as a full and complete response to the Office Action dated January 4, 2005, having a shortened statutory period for response set to expire on April 4, 2005. Please reconsider the claims pending in the application for reasons discussed below.

Claims 26-45 remain pending in the application and are shown above. Claims 1-25 have been cancelled by Applicants and claims 26-45 stand rejected by the Examiner. Claims 26-28, 30, 35, 39, and 41 have been amended to clarify the invention. Please cancel claims 29, 31-34, 38, 40, and 42-45 without prejudice. Applicants reserve the right to pursue the subject matter of claims 29, 31-34, 38, 40, and 42-45 in a divisional application at a later date. Cancellation of claims 29, 31-34, 38, 40, and 42-45 is not a concession that these claims are not patentable, but rather reflects Applicants' decision to pursue in this application the subject matter of claims 26-28, 30, 35-37, 39 and 41. Reconsideration of the pending claims is requested for reasons presented below.

Claim Rejections - 35 USC § 103

Claims 26-27, 29-30, 33-38, 40-41, and 44-45 stand rejected under 35 U.S.C. §103(a) as being obvious over *Chooi et al.* (U.S. Patent No. 6,436,824). The Examiner states that *Chooi et al.* discloses a method for depositing a barrier layer on a substrate but it fails to disclose expressly the claimed ranges. The Examiner further states that it would have been obvious to use Chooi's teaching to obtain the invention as specified in claims 26-27, 29-30, 33-38, 40-41, and 44-45. Applicant respectfully traverses the rejection.

Chooi et al. discloses forming a carbon-doped silicon nitride layer by reacting a substituted ammonia precursor and a substituted organosilane in a chamber. Alternatively, *Chooi et al.* discloses forming a silicon carbide layer using the substituted organosilanes in a chamber.

Applicants have amended claims 26 and 35 and claims dependent thereon to recite introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber and respectfully submit that *Chooi et al.* does not teach, show or suggest introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber containing the substrate therein, wherein the organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of 6:1 or greater, and reacting the organosilicon compound to form a silicon carbide layer having a dielectric constant less than 4, as recited in claims 26 and claims dependent thereon.

In addition, *Chooi et al.* does not teach, show or suggest depositing a barrier layer on the substrate by introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber containing the substrate therein, wherein the organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of 6:1 or greater and the barrier layer has a dielectric constant less than 5, and depositing a first dielectric layer adjacent the barrier layer, wherein the first dielectric layer comprises silicon, oxygen, and carbon and has a dielectric constant of about 3 or less, as recited in claims 35 and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

Claims 28 and 39 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Chooi et al.*, as applied above, in view of *Yang et al.* (U.S. Patent No. 6,365,527). Applicant respectfully traverses the rejection.

Chooi et al. has been discussed above.

Yang et al. discloses treating a silicon carbide layer with an ammonium plasma treatment step. The silicon carbide layer of *Yang et al.* is deposited by reacting an organosilicon compound, such as silane/methane, dimethylsilane, trimethylsilane, tetramethylsilane or other organosilicon precursor gas in a chamber. *Yang et al.* does not teach, show or suggest introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber.

Therefore, *Chooi et al.*, in view of *Yang et al.*, alone or in combination, do not teach, show, or suggest introducing a processing gas comprising an organosilicon

compound and a dopant compound into a processing chamber, wherein the organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of 6:1 or greater, and reacting the organosilicon compound to form a silicon carbide layer having a dielectric constant less than 4, as recited in claims 26 and 35, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

Claims 31-32 and 42-43 are rejected under 35 U.S.C. §103(a) as being obvious over *Chooi et al.*, as applied above, in view of *Olsen et al.* (U.S. Patent No. 6,528,426). Applicant respectfully traverses the rejection.

Chooi et al. has been discussed above.

Olsen et al. discloses a method of fabricating an inlaid interconnect using a silicon carbide polish stop layer deposited by plasma enhanced chemical vapor deposition (PECVD) with silane, methane, trimethylsilane, or other organosilicon gas with a plasma density of 0.25watt/cm². *Olsen et al.* does not teach, show or suggest introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber.

Therefore, *Chooi et al.*, in view of *Olsen et al.*, alone or in combination, do not teach, show, or suggest introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber, wherein the organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of 6:1 or greater, and reacting the organosilicon compound to form a silicon carbide layer having a dielectric constant less than 4, as recited in claims 26 and 35, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

Applicants respectfully present new claims 46-56 to be considered by the Examiner. Applicants respectfully submit that *Chooi et al.*, *Yang et al.*, and *Olsen et al.*, alone or in combination, do not teach, show, or suggest introducing a processing gas comprising an organosilicon compound into a processing chamber, wherein the organosilicon compound has the formula $\text{SiH}_a(\text{CH}_3)_b(\text{C}_6\text{H}_5)_c$, wherein c is 2, and

$a+b+c=4$, and reacting the organosilicon compound to deposit the silicon carbide layer on the substrate, as recited in new Claims 46-51.

In addition, Applicants respectfully submit that *Chooi et al.*, *Yang et al.*, and *Olsen et al.*, alone or in combination, do not teach, show, or suggest introducing a processing gas comprising an organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of 6:1 or greater to deposit the silicon carbide layer on the substrate, wherein the silicon carbide layer comprises less than about 15 atomic percent of oxygen, as recited in new Claims 52-56.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant's disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this office action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



Keith M. Tackett
Registration No. 32,008
MOSER, PATTERSON & SHERIDAN, L.L.P.
3040 Post Oak Blvd. Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Attorney for Applicant